

## Patent Claims

1. Circuit board having at least one connection bore (11; 21) for receiving a connection wire, or pin, (111) of an electronic component (110) of a predetermined wire, or pin, diameter (112), characterized in that, provided for secure holding of the connection wire, or pin, (111), is a holding mechanism (15; 25; 35; 45; 55; 65; 75; 85; 95; 101) in the form of a narrowing in the connection bore (11; 21) to a diameter which is smaller than that of the connection wire, or pin, (111).
2. Circuit board as claimed in claim 1, characterized in that the narrowing (15; 25; 35; 45; 55) is brought about by a foil (13; 23; 33; 43; 53).
3. Circuit board as claimed in claim 2, characterized in that the foil (13; 33; 43; 53) narrowing the cross section of the connection bore (11) is arranged on a surface of the circuit board (10; 23; 40; 50).
4. Circuit board as claimed in claim 2, characterized in that the circuit board is a multi-ply circuit board (20) and that the foil (23) narrowing the cross section of the connection bore (21) is an inner ply of the circuit board (20).
5. Circuit board as claimed in one of the claims 2 to 4, characterized in that the foil (43) is slit in the area of the connection bore (11).
6. Circuit board as claimed in one of the claims 2 to 4, characterized in that the foil (33; 53) is provided with a hole in the area of the connection bore (11).
7. Circuit board as claimed in one of the claims 2 to 6, characterized in that the foil (13; 23; 33; 43; 53)

comprises an electrically conductive material.

8. Circuit board as claimed in one of the claims 2 to 6, characterized in that the foil (13; 23; 33; 43; 53) comprises an insulating, electrically non-conducting material.

9. Circuit board as claimed in claim 1, characterized in that the narrowing (65) is brought about by a unilateral bore (16), which is not completely traversing.

10. Circuit board as claimed in claim 1, characterized in that the narrowing is brought about by a beaker-shaped shell (101) provided with a restriction and situated in a traversing bore.

11. Circuit board as claimed in claim 1, characterized in that the narrowing (75; 85; 95) is brought about by two bores (17, 36; 27, 46; 37, 56).

12. Circuit board as claimed in claim 11, characterized in that the narrowing (85) is brought about by two equally directed bores (27, 46) having different diameters.

13. Circuit board as claimed in claim 11, characterized in that the narrowing (75; 85; 95) is brought about by two oppositely directed bores (17, 36; 27, 46; 37, 56).

14. Circuit board as claimed in claim 13, characterized in that the narrowing (75) is brought about by two oppositely directed bores (17, 36), which are offset relative to one another.

15. Method for manufacturing a circuit board (10; 30; 40; 50) having at least one connection bore (11) for receiving a connection wire, or pin, (111) of an electronic component (110) of a predetermined wire, or pin, diameter

(112), characterized in that:

- following manufacture of at least one ply, or layer, of the circuit board and drilling of the connection bore (11), a foil (13; 33; 43; 53) is applied onto a surface of the circuit board (10; 30; 40; 50), covering the connection bore (11);
- the foil (13; 33; 43; 53) is opened in the area of the connection bore (11) in such a manner that a narrowing (15; 35; 45; 55) in cross section of a part of the connection bore (11) is formed, wherein the narrowing is smaller than the wire, or pin, diameter (112) of the electronic component (110) and provides a holding mechanism for secure holding of the connection wire, or pin, (111).

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16. Method as claimed in claim 15, characterized in that the foil (13; 33; 43; 53) is slit in the area of the connection bore (11).

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17. Method as claimed in claim 15, characterized in that the foil (13; 33; 43; 53) is provided with a hole in the area of the connection bore (11):

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18. Method as claimed in one of the claims 15 or 16, characterized in that the foil (13; 33; 43; 53) is opened by means of laser.

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19. Method for manufacturing a circuit board (60) having at least one connection bore (11) for receiving a connection wire, or pin, (111) of an electronic component (110) of a predetermined wire, or pin, diameter (112), characterized in that:

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- the circuit board (60) is manufactured with at least one ply, or layer;
- from a surface of the circuit board (60), the circuit board is drilled with a drilling tool of a nominal diameter, in such a manner that the drilling tool

does not completely pass through the circuit board (60) and the connection bore (11) therefore has in a region a cross section of diameter smaller than the wire, or pin, diameter (112) of the electronic component (110), so that a narrowing (65) brought-about thereby in the cross section of the connection bore (11) forms a holding mechanism for secure holding of the connection wire, or pin, (111).

20. Method for manufacturing a circuit board (60) having at least one connection bore (11) for receiving a connection wire, or pin, (111) of an electronic component (110) of a predetermined wire, or pin, diameter (112), characterized in that:

- the circuit board (60) is manufactured with at least one ply, or layer;
- the circuit board (60) is completely drilled-through at a location desired for the connection bore (11);
- into the connection bore (11) is placed a beaker-shaped insert (101), which has a restriction (106) in its cross section, the diameter (104) of the restriction being smaller than the wire, or pin, diameter (112) of the electronic component, the restriction representing a holding mechanism for secure holding of the connection wire, or pin, (111).

21. Method for manufacturing a circuit board (60) having at least one connection bore (11) for receiving a connection wire, or pin, (111) of an electronic component (110) of a predetermined wire, or pin, diameter (112), characterized in that:

- the circuit board (60) is manufactured with at least one ply, or layer;
- a blind hole (46) is drilled, with a drilling tool having a desired diameter (12), into the circuit board (60) at a location desired for the connection bore (11);

- then the floor of the blind hole (46) is drilled-through with a drilling tool having a diameter smaller than the wire, or pin, diameter (112), in order to form a second bore (27), so that a narrowing (85) created thereby in the cross section of a part of the connection bore (11) forms a holding mechanism for secure holding of the connection wire, or pin, (111).
22. Method for manufacturing a circuit board (60) having at least one connection bore (11) for receiving a connection wire, or pin, (111) of an electronic component (110) of a predetermined wire, or pin, diameter (112), characterized in that:
- the circuit board (60) is manufactured with at least one ply, or layer;
  - at a location desired for the connection bore (11), a first blind hole (17) is drilled into the circuit board (60) from a first surface of the circuit board with a drilling tool of a desired diameter;
  - from a second surface of the circuit board (60), there is drilled into the circuit board (60) a second blind hole (36), which is arranged slightly offset from the first blind hole (17) and which meets the first blind hole (17), so that, by the offset of the two blind holes (17, 36) relative to one another, a restriction (75) is formed, which represents a holding mechanism for secure holding of the connection wire, or pin, (111).
23. Method for manufacturing a circuit board (60) having at least one connection bore (11) for receiving a connection wire, or pin, (111) of an electronic component (110) of a predetermined wire, or pin, diameter (112), characterized in that:
- the circuit board (60) is manufactured with at least one ply, or layer;

- at a location desired for the connection bore (11), a first blind hole (37) is drilled into the circuit board (60) from a first surface of the circuit board with a drilling tool of a desired diameter;
- 5 - from a second surface of the circuit board (60), there is drilled into the circuit board (60) a second blind hole (56), which is arranged essentially axially parallel and aligned with the first blind hole (37) and which meets the first blind hole (37)
- 10 but does not extend completely into it, so that, in a portion of the connection bore (11), where the two blind holes (37, 56) meet one another, a restriction (95) is formed, which represents a holding mechanism for secure holding of the connection wire, or pin,
- 15 (111).

24. Use of a circuit board (10; 20; 30; 40; 50; 60) as claimed in one of the claims 1 to 14 with at least one electronic component (110) held in the connection bore (11) by means of a holding mechanism (15; 25; 35; 45; 55; 65; 75; 85; 95; 106) for soldering the component (110) in a reflow soldering oven.

25. Use of a circuit board (10; 20; 30; 40; 50; 60) as claimed in claim 24 for a soldering method, in which the component (110) is soldered hanging below the circuit board (10; 20; 30; 40; 50; 60) in a reflow soldering oven.

26. Use of a circuit board (10; 20; 30; 40; 50; 60) as claimed in one of the claims 1 to 14 with at least one electronic component (110) held in the connection bore (11) by means of a holding mechanism (15; 25; 35; 45; 55; 65; 75; 85; 95; 106), for soldering the component (110) in a wave soldering facility.

27. Use of a circuit board (10; 20; 30; 40; 50; 60), manufactured in a method as claimed in one of the claims

15 to 23 and populated with at least one electronic component (110) held in the connection bore (11) by means of a holding mechanism (15; 25; 35; 45; 55; 65; 75; 85; 95; 106), for soldering the component (110) in a reflow  
5 soldering oven.

28. Use of a circuit board (10; 20; 30; 40; 50; 60) as claimed in claim 27 for a soldering method, in which the component (110) is soldered hanging beneath the circuit  
10 board (10; 20; 30; 40; 50; 60) in the reflow soldering oven.

29. Use of a circuit board (10; 20; 30; 40; 50; 60), manufactured in a method as claimed in one of the claims  
15 15 to 23 and populated with at least one electronic component (110) held in the connection bore (11) by means of a holding mechanism (15; 25; 35; 45; 55; 65; 75; 85; 95; 106), for soldering the component (110) in a wave soldering facility.